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while, the French are proposing to construct a railroad across the Sahara to connect Algeria with the river Niger. The French Government has appointed a Commission to conduct preliminary investigations, and French engineers are exploring the line of the proposed road as far as the Laghouat on the south. M. Paul Soleillet will leave shortly for St. Louis, Senegal, under orders to visit the unexplored regions lying to the east of that colony as far as Timbuktu. The *Nature* states that at a recent sitting of the Paris Geographical Society, Mr. Soleillet read a paper proposing that the railroad be made from Dakkar, on the Atlantic coast, and St. Louis. The Senegal should be opened to navigation as far as Bafoulabé and a canal constructed from thence to Bamakou, on the Niger. The Niger is now navigable from Bamakou to Timbuktu and lower down for a distance of 1500 miles. The aggregate expense of the whole work is estimated at \$5,000,000, and the population brought into close connection with Senegal at thirty-seven millions. These projects have been adopted by the High Commission and the survey for the canal will begin immediately. M. Soleillet believes that the semi-civilized races occupying the region he is to visit will be friendly to Europeans, and offer no obstacles to the success of this great project. The country from Senegal to the Niger is level, fertile and inhabited by two races, the Bambara and Solenké. Nothing would be easier than the establishment of a preliminary trade-road between the two rivers; it would suffice to mark out a straight line and clear it of bushes to enable a bullock-dray to travel for 200 or 300 miles. Amongst other products is a vegetable wax which can be reduced to oil, and made to serve many useful purposes in the arts.—Drs. Greef and Gasser have been despatched on a scientific mission to study the Zoölogy of the West African Islands.—By means of the electric light the junction of the Algerian survey with the European net-work of triangles has been completed.—One of the most important events in African exploration during the past year has been the discovery, by two Frenchmen, MM. Zweifel and Moustier, of the sources of the river Niger. Starting from Sierra Leone they ascended the Rokelle river and succeeded in crossing the Kong mountains, heretofore impassable in consequence of the hostility of the natives, and visited the heads of the three streams which, uniting after a short distance, form the Niger.

MICROSCOPY.¹

IMPROVEMENTS IN CELL-CUTTING.—Cells cut from thin sheet wax or lead are rapidly coming into use. They can be built up one upon another to form deeper cells, but are most applicable where great thickness is not required, and have the great advantage that they can be prepared, as wanted, by anybody, of any required size, with very little trouble, and almost without

¹ This department is edited by Dr. R. H. WARD, Troy, N. Y.

expense. The elegant preparations presented by Mr. Merriman at the Buffalo meeting of the American Society of Microscopists were mounted in cells of wax cut by punches made by Mr. Wm. Streeter, of Rochester. These instruments, as subsequently improved and as now made, are represented in section by Fig. 1. There is a set of four concentric tubes of iron or hard brass, of equal length, fitting smoothly within each other, and turned to a cutting edge at the lower end. When using the punches the cutting edges are to be moistened with water to prevent sticking to the wax, and the wax laid on some book leaves or writing paper to form a firm, smooth cushion. The smallest punch is then pushed through the wax sheet with a slightly rotating motion, and then the next one is placed over it and pushed

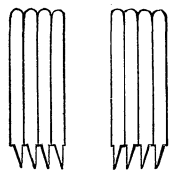


FIG. 1.—Streeter's punches.

down in the same manner, and so on to the largest. The inner punch is next withdrawn by a wooden peg or pencil thrust into it, and the others drawn out one after the other by the little finger. Each ring of wax is then pushed out of its punch with the top of the next smaller punch, leaving it flat and true. The three rings thus prepared are suitable for use with cover glasses of one-half inch, five-eighths inch and three-quarters inch diameter.

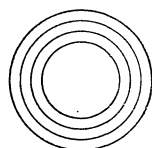
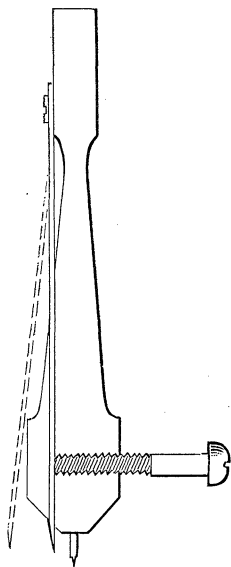


FIG. 2.—Concentric cells as cut.



FIGS. 3, 4.—Vorce's Cutter.

They may be fastened to the slide by a little warmth and pressure only, or by some kind of cement. Before using they should be coated, on the turn table, with shellac or other suitable cement, which will not only form a coating to the wax but also secure it to the slide. Cells thus made are very dainty in appearance, and very serviceable. The punches can be obtained by mail from Mr. Wm. Streeter, P. O. Box 73, Rochester, N. Y.

Of instruments adapted to cutting both wax and sheet-lead cells, two very convenient forms were brought forward by Dr. R.

H. Ward, at a recent meeting of the Troy Scientific Association. The first was designed by Mr. C. M. Vorce, of Cleveland, O., and

is represented in front view and in section in Figs. 3 and 4. It can be readily made by amateurs for their own use. It consists of a wooden body of such size as to be easily held and twirled between the fingers, with a short needle point inserted in the center of the lower end. On one side a longitudinal slot or groove is cut through the wood deep enough to allow the cutting edge to approach nearly to the needle. The cutter is of steel, one-eighth or three-sixteenths inch wide, as a piece of skirt-steel or corset-spring, and is attached so as to lie in the groove and press toward the needle. The cutter should be ground to a triangular point, and ground only on the outside, leaving its inner face flat and smooth. A screw passes through the body of the instrument and bears against the spring, regulating its distance from the needle point. Greater firmness might be secured by changing the form of the body so as to support at its two edges the cutter when forced out to its farthest limit. The other instrument, shown in Fig. 5, was suggested by the Vorce instrument, and was contrived by Mr. Frank Ritchie, of Troy. It possesses greater power and precision than the other, but is not so easily made by an amateur. It consists of a pair of spring dividers about three and one-quarter inches long, from one leg of which half an inch of its length has been cut off and replaced by a brass socket with a binding screw to hold a small knife blade. A knob is also added at the top for convenience in manipulation. The method of working these two forms of apparatus is precisely the same. A sheet of wax may be laid on a sheet of heavy white paper, and both together tacked to a piece of smooth hard wood. The instrument with its legs set three-sixteenths inch apart, is used to cut out a series of discs of three-eighths inch diameter. How near together these can be safely cut will soon be learned by experience. The legs are then set one-quarter inch apart, and using the same centers as before, a series of rings can be cut suitable for one-half inch covers. By successively spreading the legs one-sixteenth inch further each time, rings may be cut around the same centers for five-eighths and three-quarters inch covers, and larger if desired. The concentric rings around each center are cut out without waste, as shown in Fig. 2. Not only wax but also sheet-lead, card-board and gutta percha can be cut with facility in this manner. The various tools sold by hardware dealers for cutting washers of leather, etc., have often been employed for this work, but they have proved too clumsy to be useful.

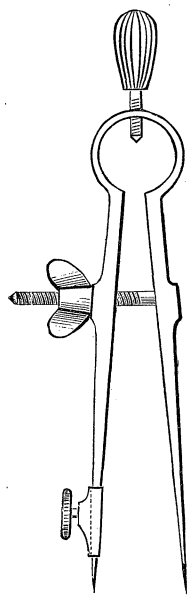


FIG. 5. — Ritchie's Cutter.

ANOTHER JOURNAL.—A successor to the late *American Quarterly Microscopical Journal* is announced, in the form of a monthly by the same editor, and in a more popular form. The first number is promised for the present month. The editor's name is a sufficient guarantee of the scientific spirit and energetic management of the new enterprise, which can scarcely fail, and ought not to fail, at the low subscription price of one dollar a year, to receive so general a support as to become self-sustaining and permanent. It is published by Romyne Hitchcock, at 51 Maiden Lane, N. Y.

ADULTERATIONS IN FOOD.—The prize offered last summer for the best two slides illustrating the adulteration of some common article of food, one slide to show the genuine article and the other to show an adulterated form actually sold and used, will be awarded at the meeting of the American Society of Microscopists, next summer. The donor, Mr. E. H. Griffeth, will substitute for the medal promised an objective suitably engraved, if preferred by the winner.

EXCHANGES. — Fine diatoms and other marine material for named diatoms, diatomaceous earths or other good mounted objects.—M. A. Booth, Longmeadow, Mass.

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SCIENTIFIC NEWS.

— In the *American Journal of Science and Arts* for December, Prof. James D. Dana, the editor, and who is, we need not remind our readers, one of the leading geologists of his time, reprints the bill for the establishment of the U. S. Geological Survey of the Public Domain, and adds his weighty comments on the "unexpected amendment" to this bill introduced by Mr. King, the geologist-in-charge, and passed by Congress at the extra session, by which the survey is extended over the whole area of the United States, including the States as well as the Western Territories. Prof. Dana observes that the amendment was not even "presented for public discussion, although it bears on the political and industrial interests of the country, as well as on the status of science under the General Government." Prof. Dana then adds that "Having been a member of the National Academy, the writer has felt it a duty here to state, that this proposed expansion of the field of work under the 'Director of the Geological Survey' is wholly foreign to the views expressed in the Report of the Committee, and to the opinions brought out in their discussions. Moreover, it is entirely at variance with the objects set before the committee by the Act of Congress requiring its appointment: this act asking that the members 'take under consideration the methods and expenses of conducting all surveys of a scientific character under